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SPECIFICATION

1. Title of the Invention

Integral oil and fat composition for manufacturing confectionery and breads

2. Claims

1. An integral oil and fat composition for manufacturing confectionery and breads of an emulsion system of a water-in-oil type, in which the integral oil and fat composition for manufacturing confectionery and breads has a solid fat index of an oil phase at 30 °C in the range of 5 - 25 and contains a thickening agent in a water phase.
2. An integral oil and fat composition for manufacturing confectionery and breads according to Claim 1, in which the thickening agent is selected from the group consisting of proteins and polysaccharides.

3. Detailed Description of the Invention

The present invention relates to an integral oil and fat composition for manufacturing confectionery and breads.

A solid fat having a plasticity in which liquid and crystalline oils and fats have been mixed homogenously has been considered desirable to the integral oils and fats for manufacturing confectionery and breads, and thus butter and lard have been used for a long time. Researches in this field have progressed recently, and processed oils and fats such as margarine and shortening which have better workability as compared with butter or lard have been developed and employed.

It is the most important function as the integral oil and fat composition for manufacturing confectionery and breads that fats and oils are dispersed uniformly in a short time in all parts of dough at the time of

mixing during the process for manufacturing confectionery and breads. It is known that the quality of confectionery and breads is improved by the uniform dispersion of integral fats and oils in all parts of the dough. By way of example, the developing time of the dough which is the mixing time until the dough can be extended may be shortened, mixing stability may be improved, extensibility may also be improved, and expansion may be enhanced as well after the addition of oils and fats. In addition, loss of the dough due to the adhesion to machines will be reduced, and the damage of the surface of the dough due to the machines at the time of degassing will be decreased. Furthermore, the stability of the dough during baking will be improved, and thus advantages such as increased volume of the product with fine texture, thin kraft, and uniform surface baking are obtained.

Thus, the integral oils and fats for manufacturing confectionery must be dispersed into all parts of the dough at the time of mixing. It also goes without saying that the shorter mixing time required for uniformly dispersing the integral oils and fats into the dough is all the more useful. That is to say, when the mixing time is constant, it is more convenient to decrease the time for uniformly dispersing the oils and fats.

In order to obtain the integral oils and fats for manufacturing confectionery and breads which can be dispersed uniformly in all parts of dough in a short time, efforts have been made in former researches including blending properly a solid fat having a high melting point with a solid fat having a low melting point and a liquid oil so as the solid fat index of oils and fats during mixing to be in an appropriate range or devising the kneading method such as the more strong kneading at quenching. However, these integral oils and fats are not satisfactory to those for manufacturing confectionery and breads.

The present inventors have carried out earnest researches for the purpose of obtaining an integral oil and fat composition which can be

dispersed uniformly in all parts of dough in a short time. As a result, the present inventors have found that an oil and fat composition suitable for this object can be obtained by selecting a particular solid fat index and further mixing a thickening agent with an aqueous phase of an oil and fat emulsion of a water-in-oil type, and thus accomplished the present invention.

That is to say, the present invention provide an integral oil and fat composition for manufacturing confectionery and breads of an emulsion system of a water-in-oil type, in which the integral oil and fat composition for manufacturing confectionery and breads has a solid fat index of an oil phase at 30°C in the range of 5 - 25 and contains a thickening agent in a water phase.

The thickening agent which can be used in the present invention includes, for example, a protein, a polysaccharide, and the like.

While the protein may be a material which shows viscosity on dissolving it in water, it is preferably a milk protein and a phytoprotein in concrete terms. The milk protein preferably includes sodium casein, calcium casein, rennet casein, milk casein, milk whey, lactalbumin, and lactoglobulin, and two or more of the milk proteins may be used in combination. Also, it is possible to use the milk protein in combination with the phytoprotein and the polysaccharide.

The phytoprotein includes soybean protein, wheat protein, rice protein, corn protein, and the like, and it is preferably the soybean protein and the wheat protein. It is also possible to use two or more of the phytoproteins in combination. In addition, it is possible to use the phytoprotein in combination with the milk protein and the polysaccharide.

The polysaccharide may be a material which shows viscosity on dissolving it in water, and it is preferably a natural gum and a synthetic gum. As the natural gum, it is concretely possible to use gum arabic, carrageenan, locust bean gum, xanthan gum, tamarind seed polysaccharide, gum

tragacanth, dextrin, α-starch, starch, and the like, preferably gum arabic, carrageenan, locust bean gum and xanthan gum.

The synthetic gum includes carboxymethyl cellulose, methyl cellulose, sodium alginate, and the like, preferably carboxymethyl cellulose and methyl cellulose.

It is also possible to use two or more of the polysaccharides in combination, and it is also possible to use the combination of a milk protein and a phytoprotein.

Among these thickening agents, rennet casein, sodium casein, lactalbumin, soybean protein, xanthan gum, and locust bean gum are particularly preferred.

Since the integral oil and fat composition for manufacturing confectionery and breads of the present invention is a W/O type oil and fat emulsion composition which can be dispersed uniformly in a short time in all parts of dough, the viscosity of the aqueous phase (W) of the W/O type oil and fat emulsion at an incorporation temperature (usually 25 - 50°C) of the oils and fats into dough is important. Thus, the aqueous phase of the present invention is not provided by the content of the thickening agent, but should be provided by the viscosity of the aqueous phase at a range of 25 - 50°C as the operation temperature. The viscosity of the aqueous phase suitable for the object of the present invention may be 5 cps or more at 25°C, preferably in the range of 100 cps - 20,000 cps. Furthermore, the value of the viscosity of the aqueous phase herein is the one of a sample of 180 ml which is placed in a torr beaker having a volume of 4.8 cm of an internal diameter x 15 cm of a height and measured at a rotor speed of 12 rpm.

No specific limitation is provided for edible oils and fats used for the oil and fat composition of the present invention. It is possible to use either of plant oils and fats such as soybean oil, rapeseed oil, palm oil, corn oil, cottonseed oil, coconut oil, palm kernel oil, and the like, or animal oils and

fats such as tallow, lard, fish oils, whale oil, milk fat, and the like as well as hydrogenated products thereof and transesterization products thereof.

Furthermore, the solid fat index of the oil phase which can be used in the present invention is required to be in the range of 5 - 25 at 30°C. The oil phase offers no problem if it satisfies the range of the solid fat index. Furthermore, the oil fat index is desirably in the range of 10 - 30 at 20°C and 2 - 20 at 35°C, particularly 15 - 25 at 20°C.

While the process for obtaining the oil and fat composition of the present invention is not specifically limited, a process for heat dissolving an edible emulsifier into an oil phase and adding an aqueous phase in which a thickening agent has been dissolved to this solution to form a mixture by stirring prior to quenching and kneading of the mixture is preferred. It is also possible to include gas into the product in order to improve plasticity.

The edible emulsifier may be an emulsifier which can be used for foods and includes, for example, emulsifiers such as glycerol higher fatty acid monoesters, sucrose higher fatty acid esters, propylene glycol higher fatty acid monoesters, sorbitan higher fatty acid partial esters, polyoxyethylene sorbitan higher fatty acid partial esters, lecithin, and the like. These emulsifiers can also be used in combination.

It is appropriate to make the weight ratio of the oil phase and the aqueous phase of the oil and fat composition of this invention in the range of 40 : 60 - 90 : 10. Moreover, there may be added dairy products other than the milk proteins, for example, cheese, cream, whole fatted milk powder, skim milk powder, fermented milk, vegetable cream, perfume, colorant, flavoring agent, sweetening agent, saccharides, sodium chloride, and the like to the oil and fat composition of the present invention in order to improve taste and nutrition of the composition, if necessary.

The present invention is now described in more details in the followings with reference to Examples, Comparative Examples and Test

Examples, but it should not be construed that the present invention is limited to these examples. In these examples, all of the parts and percents are measured on the basis of weight.

Example 1

To 80 kg of a mixed oil consisting of 15% of a fish hardened oil (ascending melting point: 45°C), 40% of a fish hardened oil (ascending melting point: 30°C), 30% of a lard, and 15% of a soybean white squeezed oil were added 1.8 kg of a glycerol higher fatty acid monoester (the higher fatty acid comprising palmitic acid and stearic acid) and 0.2 kg of soybean lecithin, and the mixture was dissolved under heating to form an oil phase. To this oil phase was added an aqueous phase in which 2.5 kg of rennet casein was dissolved into 15.5 kg of water (having a viscosity of 13,000 cps at 25°C), and the mixture was stirred, quenched and kneaded to give a W/O type oil and fat emulsion composition. The solid fat index of the oil phase was 18.6 at 20°C, 11.2 at 30°C, and 5.8 at 35°C.

Example 2

To 82 kg of the oil phase used in Example 1 was added an aqueous phase in which 2.5 kg of sodium casein and 0.5 kg of lactalbumin were dissolved in 15 kg of water (having a viscosity of 18,000 cps at 25°C), and the mixture was stirred, quenched and kneaded to give a W/O type oil and fat emulsion composition.

Example 3

To 82 kg of the oil phase used in Example 1 was added an aqueous phase in which 3 kg of soybean protein was dissolved in 15 kg of water (having a viscosity of 15,000 cps at 25°C), and the mixture was stirred, quenched and kneaded to give a W/O type oil and fat emulsion composition.

Example 4

To 82 kg of the oil phase used in Example 1 was added an aqueous

phase in which 100 g of xanthan gum was dissolved in 17.9 kg of water (having a viscosity of 1,800 cps at 25°C), and the mixture was stirred, quenched and kneaded to give a W/O type oil and fat emulsion composition.

Example 5

To 82 kg of the oil phase used in Example 1 was added an aqueous phase in which 2 kg of sodium casein and 100 g of locust bean gum was dissolved in 15.9 kg of water (having a viscosity of 14,000 cps at 25°C), and the mixture was stirred, quenched and kneaded to give a W/O type oil and fat emulsion composition.

Comparative Example 1

To 82 kg of the oil phase used in Example 1 was added an aqueous phase in which 5 kg of skim milk powder was dissolved in 15 kg of water (having a viscosity of 4 cps at 25°C), and the mixture was stirred, quenched and kneaded to give a W/O type oil and fat emulsion composition.

Comparative Example 2

To 82 kg of the oil phase used in Example 1 was added an aqueous phase in which 9 kg of raw cream was dispersed in 9 kg of water (having a viscosity of 4 cps at 25°C), and the mixture was stirred, quenched and kneaded to give a W/O type oil and fat emulsion composition.

Test Example 1

As for the dough of a bread, mixing times until each oil and fat composition obtained in Examples 1 - 5 and Comparative Examples 1 - 2 was completely incorporated into dough were measured. The mixing method was based on the inner seed (NAKATANE) method described on page 156 of Koji Taketani "Basic Knowledge of New Methods for Manufacturing Breads" (Pan News Co.). That is to say, 70 parts of flour, 40 parts of water, 2 parts of yeast, and 0.12 part of yeast food were first put into a bowl and mixed with a mixer at a low speed for 2 minutes and at a medium-to-high speed for 2 minutes. The mixture was then placed in a fermentation chamber at a

temperature of 27°C and a humidity of 75% to carry out inner seed fermentation for 4 hours. In the next step, the inner seed dough that the inner seed fermentation had been accomplished was placed in a bowl, and 30 parts of flour, 24 parts of water, 6 parts of sugar, 2 parts of salt, and 2 parts of skim milk powder were further added to the dough and mixed at a low speed for 2 minutes, at a medium-to-high speed for 2 minutes, and at a high speed for 1 minute. To the mixture was added five parts of an oil and fat composition which had been preliminarily maintained at a temperature of 25°C in order to blend at a low speed, and then the mixing time until the oils and fats were completely incorporated into the dough (the time until the gloss of the oils and fats disappeared from the surface of the dough) was measured. The results are shown in Table 1.

Test Example 2

The oil and fat compositions obtained in Examples 1 - 5 and Comparative Examples 1 - 2 were evaluated by manufacturing breads (one-loafs) according to the inner seed ("Basic Knowledge of New Methods for Manufacturing Breads", op. cit., p. 156). The specific manufacturing method was as follows: after mixing of the dough to which the oil and fat composition had been added in Test Example 1 at a medium-to-high speed for 3 minutes and then at a high speed for 1 minute, followed by the floor time at room temperature for 20 minutes, cutting the dough into portions of a certain amount, and the bench time at room temperature for 20 minutes, the dough was breathed in a molder, and then placed in a certain amount into a bread die, which was placed into a hoiro (dough conditioner) maintained at a temperature of 58°C and a humidity of 85%, fermented for 40 minutes, and baked at 210°C for 35 minutes to manufacture the bread (one-loaf). The volume of the bread thus manufactured by this method was measured by the rapeseed substitution method. The results are shown in Table 1.

Test Example 3

The mechanical resistance properties of dough (adhesion of dough to a machine, and damage of the surface of dough caused by a machine) and the qualities of the breads produced (total evaluation regarding to each of appearance, skin color, shaping uniformity, baking uniformity, skin quality, inner phase, pore formation, inner color, touch, odor, and taste) were evaluated organoleptically by five bread manufacturing technologists as panelists. The results are shown in Table 1.

Table 1

Evaluation item / Oil and fat composition used	Mixing time (min, sec)	Volume of breads (ml)	Organoleptic evaluation*	
			Mechanical resistance properties of dough	Quality evaluation of breads
Example 1	58 sec	2,800	5	5
Example 2	1 min 03 sec	2,750	5	5
Example 3	1 min 08 sec	2,690	5	5
Example 4	1 min 05 sec	2,710	5	5
Example 5	1 min 10 sec	2,650	5	5
Comparative Example 1	3 min 18 sec	2,100	3	3
Comparative Example 2	3 min 50 sec	1,900	2	2

Note* Grades of organoleptic evaluation

Grade 5: obviously superior to the conventional integral margarines or shortenings;

Grade 4: slightly superior to the conventional integral margarines or shortenings;

Grade 3: equal to the conventional products;

Grade 2: slightly inferior to the conventional integral margarines or shortenings;

Grade 1: obviously inferior to the conventional integral margarines or shortenings.

As apparent from Table 1, the oil and fat compositions in Examples 1 - 5 made the mixing time obviously shorter and the volume of breads larger than those in Comparative Examples 1 and 2, and good results were also obtained in the organoleptic evaluation.